

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Fuel Injection Valves for Internal Combustion Engines

I, ERNST SCHÄEREN, of Swiss Nationality, of Florastrasse 32, Solothurn, Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to fuel injection valves for internal combustion engines and of the kind comprising a needle valve the seating surface of which cooperates with a seating surface formed in a nozzle member or casing adjacent to the injection aperture which is entered by an extension or plug at the lower or free end of the needle valve, the fuel itself acting on the needle valve to raise it from its seating for each injection.

It the valve as a whole is to operate effectively it is necessary that the opening and closing pressures bear the correct relationship, that is to say the area of the valve upon which the fuel can act must have the correct relationship to the area of the needle valve which is only exposed to the fuel pressure while the valve is open. Though, to this end, it is necessary that the mean diameter of the effective seating surface of the needle valve be as large as practicable, it is for other reasons desirable that the width (as measured in a direction parallel to the length of the valve) of the seating surface which contacts with the seating surface in the nozzle member be small. In addition, if efficient atomising is to be obtained, the transverse dimensions of the plug which enters the injection orifice must not be large.

In a fuel injection valve according to the present invention, when the valve is in its closed position, the seating surface within the nozzle member contacts with the seating surface of the needle valve only at a part thereof adjacent to its maximum diameter so that the effective annular seating surface of the needle valve has a small width and large diameter and there is formed between the needle valve and the nozzle member an annular clearance extending from the delivery end of the injection orifice to the contacting seating surfaces.

Thus, the nozzle member may be pro-

vided with an annular recess extending from the seating surface in the nozzle member to the injection orifice so that when the needle valve is in its closed position the seating surface within the nozzle member contacts with the seating surface of the needle valve only at a part thereof adjacent to its maximum diameter and the effective annular seating surface of the needle valve has a small width and large diameter, with an annular clearance due to the said recess between the needle valve and the nozzle member, the said clearance extending from the delivery end of the injection orifice to the contacting seating surfaces.

One construction according to the invention is illustrated by way of example in the accompanying drawing in which the casing *a* contains a needle valve *b* furnished at its lower end with a conical seating surface *c* and an extension or plug *d*. The casing *a* is provided internally with a seating surface *e* which cooperates with the seating surface *c* of the needle valve *b*. Between the lower extremity *g* of the seating surface *e* and the inner end of the injection orifice *h* is a recess *i*.

When the needle valve *b* is in the closed position the seating surface *e* of the casing contacts with a narrow portion of the conical seating surface *c* adjacent to the part of maximum diameter of this surface, and an annular clearance is formed between the lower portion of the seating surface *c* and the casing *a* and also between the plug *d* and the wall of the injection orifice *h*.

It will therefore be seen that whilst the effective seating surface of the needle valve is narrow as measured in the direction of the length of the needle valve, this effective seating surface is of large diameter whilst the diameter of the extension or plug at the lower end of the needle valve is small.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A fuel injection valve of the kind set forth in which, when the valve is in

- its closed position, the seating surface within the nozzle member contacts with the seating surface of the needle valve only at a part thereof adjacent to its maximum diameter so that the effective annular seating surface of the needle valve has a small width and large diameter and there is formed between the needle valve and the nozzle member an annular clearance extending from the delivery end of the injection orifice to the contacting seating surfaces. 20
2. A fuel injection valve of the kind set forth in which the nozzle member is provided with an annular recess extending from the seating surface in the nozzle member to the injection orifice so that when the needle valve is in its closed position the seating surface within the nozzle member contacts with the seating surface of the needle valve only at a part thereof adjacent to its maximum diameter and the effective annular seating surface of the needle valve has a small width and large diameter, with an annular clearance due to the said recess between the needle valve and the nozzle member, the said clearance extending from the delivery end of the injection orifice to the contacting seating surfaces. 25
3. The fuel injection valve for internal combustion engines as described with reference to the accompanying drawing. 30

Dated this 18th day of October, 1934.

KILBURN & STRODE,
Agents for the Applicant.

[This Drawing is a full-size reproduction of the Original.]

